Stray Creek project Scientific Information Review and Consideration

Much of the literature cited by commenters of the Stray Creek project during the combined scoping and 30-day comment period addresses a variety of resources, topics, or issues. Members of the Stray Creek project interdisciplinary team are considered proficient in their field of study by way of academic achievement, agency training, years of professional experience, and in some cases, certification programs. Team specialists identified the methods used in their analyses and referenced the scientific sources upon which their analyses were based. In their analyses, team specialists discussed responsible opposing science and viewpoints and provided science-based rationale to support their conclusions. They also addressed any incomplete or unavailable information. The interdisciplinary team considered the general principles and recommendations made in the various literature cited below; conclusions and/or determinations supported by effects analyses did not changes. Some articles, scientific studies, and reports were not applicable to the proposed activities. Other articles, scientific studies, and reports provided general or background information and were consistent with the project analysis. Commenters submitted many scientific studies that were either used in the draft environmental impact statement, considered in the response to comments (above), or were included in the final environmental impact statement. These references will not appear in the table below.

Table 1. Review and consideration to scientific information and other literature submitted by commenters for the Stray Creek project

Reference	Stray Creek Project Consideration
Anderson P.D., Larson D.J., Chan, S.S. 2007 Riparian Buffer and Density Management Influences on Microclimate of Young Headwater Forests of Western Oregon. Forest Science, 53(2):254-269. Benda, L.D. Litschert, S.E., Reeves, G. and R. Pabst. 2015. Thinning and in-stream wood recruitment in riparian second growth forests in coastal Oregon and the use of buffers and tree tipping as mitigation. Journal of Forestry Research. Burton, Julia I., Olson, Deanna H., and Puettmann, Klaus J. 2016. Effects of riparian buffer width on wood loading in headwater streams after repeated forest thinning. Forest Ecology and Management. 372 (2016) 247-257. Janisch, Jack E, Wondzell, Steven M., Ehinger, William J. 2012. Headwater stream temperature: Interpreting response after logging, with and without riparian buffers, Washington, USA. Forest Ecology and Management, 270, 302-313. Rashin, E., C. Clishe, A. Loch and J. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal of the American Water Resources Association. Paper No. 01162 Warren, Dana R., Keeton, William S., Bechtold, Heather A., Rosi-Marshall, Emma J. 2013. Comparing streambed light availability and canopy cover in streams with old-growth versus early-mature riparian forests in western Oregon. Aquatic Sciences 75:547-558.	Considered, not used. The riparian habitat conservation areas (RHCA) proposed in the Stray Creek project are consistent with the 1995 PACFISH amendment to the Clearwater National Forest Land and Resource Management Plan.

Barik et al. 2017. Improved landslide susceptibility prediction for sustainable forest management in an altered climate. Engineering Geology 230: 104-117.	Considered, but not used. The study by Barik et al., was carried out on the western side of the Olympic Peninsula, which is characterized by precipitation in the range of 98 to 236 inches annually and shallow soils ranging from 0.76 to 1.98 meters in depth (as mentioned in the study). Contrastingly, the Stray Creek Project Area receives average precipitation in the range of 26 to 45 inches annually, and soils average 1.7 to 1.8 meters in depth. Given the lower average annual rainfall and deeper soils found in the Stray Creek Project Area, the findings of Barik et al. are outside the scope of the proposed project. Additionally, site-specific BMPs will be implemented to improve drainage and potentially sensitive areas will be avoided where possible. Implementation of site-specific BMPs and avoiding potentially sensitive areas will help to mitigate the risk of landslides in both current and future climate regimes. However, this reference was mentioned in the Soil Effects Analysis (under the section headed 'No Action Alternative') in order to acknowledge the possibility of shifting landslide-prone areas due to altered climate.
Bradley, C. M., C. T. Hanson, and D. A. DellaSala. 2016. Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western United States? Ecosphere 7(10): e01492. 10.1002/ecs2.1492	This literature was reviewed but not used as it pertains to the difference in fire severity in varying forest protection status lands. The Stray Creek project does not contain any IRA or designated wilderness or any other special designations.
Buskirk, S.W, and Powell, R.A. 1994. Habitat ecology of fishers and American martens. In: Buskirk, S.W., Harestad, A.S., Raphael, M.G., and Powell, R.A. (Eds.), Martens, Sables, and Fishers: Biology and Conservation. Cornell University Press, Ithaca, New York, pp. 283–396, 484p.	Considered, but not used. More recent studies by Sauder 2014 and Sauder and Rachlow (2014, 2015) occurred on the Forest, and elaborate on the importance of at least 50% cover by mature fisher habitat and low fragmentation- 5% or less in a fisher territory.
Cooper et al. 1991. Forest Habitat Types of Northern Idaho: A Second Approximation. USDA Forest Service Intermountain Research Station General Technical Report INT-236.	Vegetation effects was updated to include information from Cooper et al (1991). White pine, ponderosa pine and western larch are all early seral components of the habitat types found within the project area.
DellaSala et al. 1995 Forest health: moving beyond rhetoric to restore healthy landscapes in the inland Northwest. Wildlife Society Bulletin 1995 23(3): 346-356.	Reviewed but not used. The Stray Creek project, from a fire/fuels perspective, would be considered a local scale. Thus, after treatment, fuel conditions will be altered to have a positive effect towards suppressing a wildfire. Fire managers have no control of weather patterns, however, fuel conditions can be modified through mechanical treatment (timber harvest).
Haig, I.T. 1932. Second growth yield, stand and volume tables for the western white pine type. Technical Bulletin 323. United States Department of Agriculture, Washington, D.C.	This literature was reviewed but not used. Stocking density is not discussed as a factor leading to the purpose and need of the project. The Stray Creek project is designed to address the root disease within the stands, not stocking densities.

Hanson, Chad 2010. The Myth of "Catastrophic" Wildfire: A New Ecological Paradigm of Forest Health. John Muir Project Technical Report 1 • Winter 2010 • www.johnmuirproject.org	The Stray Creek Project is located in timber production Forest Plan management area E1. The Clearwater Forest Plan goal for protection for this management area is to limit the fire size to 40 acres or less in mature timber. Therefore, this literature does not apply, as high intensity fire is not desired outcome in this management area.
Hayward, G.D. and R.E. Escano. 1989. Goshawk nest-site characteristics in western Montana and northern Idaho. Condor 91:476–479.	Acknowledge the research found average dbh in nest stands was 12.2 inches. A planted unit could attain that average dbh in 20-30 years years, but in the meantime, it would not offer a tree large enough to support a goshawk nest. Moser's research employed the metrics, mentioned by Hayward and Escano 1989, for the nest tree size, height and cover: forest stands with a nest tree around 100' tall and a size of 22" dbh. The 20 inch dbh in the modelled query for nesting habitat was used for the analysis. This would be the most likely habitat available for nesting. Stands of average 12.2 inches would not necessarily host such a large tree in the Stray Creek area.
Johnson, K.N. and J.F. Franklin. 2009. Restoration of federal forests in the Pacific Northwest: Strategies and management implications.	Considered, not used. This literature focuses on conservation of old growth forests in the context of forest restoration. It does not address younger stands that are infected with root and butt rot. The Stray Creek project is designed to treat the area based on stand health; where areas are highly infected with root disease and butt rots, infected and susceptible tree species would be removed while the early seral species would be retained. Where there is little or no evidence of root disease or butt rots, trees would be treated with intermediate methods (i.e. thinned) leaving fully stocked stands. By focusing our treatment design on reducing less desirable stand conditions, disease infection and susceptibility, the resulting appearance will be varied across the landscape. In addition there would be corridors of untreated RHCA and areas that are unable to be treated due to wet conditions or harvest system limitations, further adding to post treatment visual variability. While not specifically using the recommendations by Johnson and Franklin (2009), the varied appearance provided by current project design would allow for retention of structural components for wildlife, and reduce visual effects. For old growth; the project is currently meeting Forest Plan standards.

Lloyd, R. A., Lohse, K. A., Ferre, T. P. A. 2013. Influence of road reclamation techniques on forest ecosystem recovery. Frontiers of Ecology and Environment 11(2): 75–81. http://www.esajournals.org/do7i/abs/10.1890/120116	Considered, not used. This document recommended for review for road decommissioning. The Stray Creek project does not proposed road decommissioning. Temporary roads will be decommissioned after use.
McCauley, Lisa A., Robles, Marcos D., Wooley, Travis, Marshall, Robert M., Kretchun, Alec, Gori, David F. 2019. Large- scale forest restoration stabilizes carbon under climate change in Southwest United States. Ecological Applications, 0(0), 2019, e01979.	Reviewed but not used. The study took place in a dry fire-adapted forest and compared different management strategies including thinning and prescribed fire, with a purpose of reducing wildfire severity. The purpose of Stray Creek is to address the root disease and butt rot found within the stands, and to maintain appropriate forest cover long-term on the site while maximizing growth and yield.
McClelland, B. R., and P. T. McClelland. 1999. Pileated woodpecker nest and roost trees in Montana: links with old growth and forest "health." Wildlife Society Bulletin 27: 846- 857.	Considered but not used. Moser 2007 is used as the recent study occurred on the Forest and metrics of the nest tree were slightly different than the 1999 article.
Morrison, M. L., and M. G. Raphael. 1993. Modeling the dynamics of snags. Ecological Applications. 3:322-330. Raphael, M. G., and M. White. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monographs. 86:1-66. Thomas, J. W. 1979. Wildlife habitats in managed forests: the Blue Mountains of Oregon and Washington. U.S. Department of Agriculture, Forest Service, Agriculture Handbook No. 553, Washington, D.C. Zarnowitz, J. E., and D. A. Manuwal. 1985. The effects of forest management on cavity-nesting birds in northwestern Washington. Journal of Wildlife Management. 49:255-263.	Considered, but not used. Regional guidelines are Bollenbacher et al. 2009 and will be used to retain snag habitat within units.
Moser, B.W., and E.O. Garton. 2009. Short-term effects of timber harvest and weather on Northern Goshawk reproduction in northern Idaho. J. Raptor Res. 43, 1–10.	No old growth would be harvested. Legacy trees (at or greater than 20 inches dbh) are likely to be retained. The project area is about 839 acres with 2 acres of current openings and harvest would occur on approximately 425 acres; retaining 412 acres of potential goshawk habitat in old growth and riparian areas. About 50% of the habitat in the project area would be available for goshawk. Proposed activities would affect about 16% of goshawk nesting habitat.
Raley, C.M., E.C. Lofroth, R.L. Truex, J.S. Yaeger, & J.M. Higley. 2012. Habitat ecology of fishers in Western North America. In Biology and Conservation of martens, sables and fishers. Editors: Aubry, Zielinski, Raphael, Proulx,& Buskirk. Chapter 10: 231-254.	Upon completion of the project activities, openings would occur in 49% of the project area.
Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the Northern Goshawk in the southwestern United States. USDA Forest Service General Technical Report RM-217, Fort Collins, CO U.S.A.	This reference is not considered, as more recent research (that occurred on the Forest) is more relevant (Moser 2007).

Schultz, C. 2010. Challenges in connecting cumulative effects analysis to effective wildlife conservation planning. BioScience 60:545–551.	Reviewed but not used. The author's case study finds that cumulative effects analysis based on habitat metrics fail to account for long-term or broad-scale impacts on population monitoring. Habitat metrics are used for wildlife species analysis at the project or larger scale to identify potential habitat, and the possible impacts of the project actions to species in the analysis area. In addition, based on case law, it is appropriate for the agency to use measurements of habitat availability as a proxy for population/viability assessments (Inland Empire Public Lands Council v. USFS 1995, Lands Council v. McNair 2008).
Veblen 2003. Key issues in Fire Regime Research for Fuels Management and Ecological Restoration. USDA Forest Service Proceedings RMRS-P-29.	This was considered but not used for the Stray Creek project because the need for the Stray Creek proposal does not include fuels reduction.